

# Headache of a diagnosis: frontotemporal pain and inflammation associated with osteolysis

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*A 62-year-old woman presented with left frontotemporal pain, scalp tenderness and raised levels of inflammatory markers. Temporal arteritis was considered likely, and symptoms resolved with prednisone therapy. This delayed diagnostic bone biopsy until a soft tissue abscess formed, and Pott's puffy tumour associated with *Prevotella osteomyelitis* of the frontal bone was diagnosed. This case highlights the value of early histopathological examination, and is a reminder of a condition seen frequently in the pre-antibiotic era. (MJA 2008; 189: 591-592)*

## Clinical record

A 62-year-old woman was referred with a 6-month history of spontaneous left frontotemporal scalp pain. Initially, the pain was associated with a soft swelling over the scalp and resolved within 6 weeks. It recurred 4 months later, without associated swelling, localised to the left frontal region and became progressively more severe, disturbing the patient's sleep. She remained systemically well and had no history of fever, sinusitis, dental infection or diabetes mellitus.

Investigation by the patient's general practitioner revealed raised erythrocyte sedimentation rate (130 mm/h; reference range [RR], <20 mm/h), C-reactive protein (66 mg/L; RR, <3 mg/L) and alkaline phosphatase (121 U/L; RR, 25–100 U/L). There was no para-protein in the serum or urine. A plain radiograph revealed apparent osteolysis (Box, A) and a bone scan revealed intense uptake of technetium-99m-methylenediphosphonate in the skull (Box, B). A computed tomography (CT) scan confirmed diffuse lucency in the left frontal bone, without evidence of underlying sinusitis. These radiological and scintigraphic features suggested osteoporosis circumscripta cranii (the lytic phase of Paget's disease of the skull), although the raised inflammatory markers were inconsistent with this diagnosis. A specialist opinion was sought.

At review, the patient was afebrile and results of physical examination were normal except for marked tenderness over the left temporal region, raising the possibility of giant cell arteritis. Urgent temporal artery biopsy was arranged while the patient began oral prednisone therapy (80 mg per day). Her condition improved dramatically — the pain was alleviated and levels of inflammatory markers decreased — but no histological evidence of vasculitis in the temporal artery was found. A presumptive diagnosis of biopsy-negative giant cell arteritis was made, and oral corticosteroid therapy was continued with a tapering regimen. Prophylactic trimethoprim-sulfamethoxazole (320 mg/1600 mg twice per week) was administered to prevent *Pneumocystis* infection; concurrently, bisphosphonate therapy was begun (40 mg alendronate per day) for suspected osteoporosis circumscripta cranii.

The occurrence of two separate pathological processes was considered improbable, and a skull biopsy for definitive diagnosis was discussed with the patient. However, she was reluctant to undergo further invasive testing because of the rapid symptomatic improvement. She was monitored clinically and biochemically at regular intervals while the prednisone dose was reduced over the following 6 months. Throughout this period, she remained pain-free and systemically well, with normal levels of inflammatory markers.

Six months after initiation of corticosteroid therapy, while the patient was taking 10 mg of prednisone per day, she developed a tender fluctuant swelling over the left frontal region of the scalp. The swelling enlarged rapidly, and a CT scan revealed a 6 × 11 × 4.5 cm collection overlying the left frontal bone (Box, C). Neurosurgical consultation and exploration of the swelling were arranged.

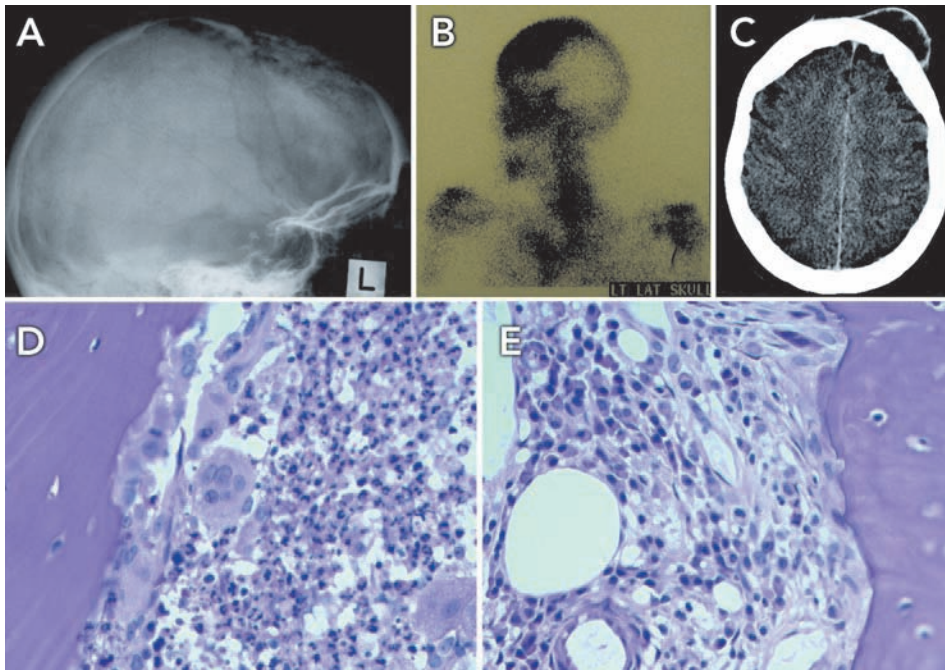
During exploratory surgery, copious malodorous pus was drained and a biopsy sample of the underlying skull, which appeared discoloured, was taken. A pure growth of *Prevotella* sp., an anaerobic gram-negative rod-shaped bacterium, was isolated on culture of the pus. The organism was identified as either *Prevotella melaninogenica* or *Prevotella oralis*. Histopathological examination of the biopsy sample revealed infiltration of the marrow spaces by neutrophils (Box, D), and the presence of plasma cells with admixed fibrosis (Box, E), consistent with concurrent acute and chronic osteomyelitis.

The diagnosis was revised to *Prevotella* osteomyelitis of the frontal bone with associated soft tissue abscess (Pott's puffy tumour). Prednisone and alendronate were withdrawn, and the patient was treated with intravenous antibiotics for 6 weeks. As the organism was penicillin-resistant, clindamycin (600 mg four times per day) was administered for 2 weeks, and this was followed by ertapenem (1 g per day) as outpatient therapy. The intravenous antibiotics were combined with oral metronidazole (400 mg three times per day) and were followed by treatment with oral clindamycin (300 mg four times per day) for another 6 weeks. The patient's condition responded rapidly to medical management and she remained clinically well with normal levels of inflammatory markers at 12-month follow-up. A subsequent CT scan of the calvaria showed resolution of the lytic changes without bony sequestrum.

## Discussion

Anaerobic organisms predominate in head and neck infections, occurring in a mixed growth in more than 90% of dental, oral and neck space infections.<sup>1</sup> Clinically relevant anaerobes include the gram-negative rods *Bacteroides*, *Prevotella*, *Porphyromonas*, *Fusobacterium* and *Bilophila*, and gram-positive rods (eg, *Clostridium*, *Actinomyces* and *Propionibacterium*) and cocci (eg, *Peptostreptococcus*).<sup>1</sup> Despite frequently being found in mixed bacterial populations, *Prevotella* sp. was isolated as a pure growth in our patient. Although trimethoprim-sulfamethoxazole therapy (used as *Pneumocystis* prophylaxis in our patient) is generally thought to lack useful activity against anaerobes,<sup>1</sup> it may have suppressed the infection.

**Radiography and computed tomography (CT) scans, and bone biopsy specimens, of a patient with Pott's puffy tumour associated with *Prevotella* osteomyelitis of the frontal bone**



**A:** Plain radiograph of the skull before corticosteroid therapy, showing patchy osteolytic areas in the frontal cranium.  
**B:** Delayed skull spot views on a bone scan before corticosteroid therapy, showing accumulation of technetium-99m-methylenediphosphonate.  
**C:** CT scan of brain (using intravenous iopamidol contrast medium) after 6 months of corticosteroid therapy showing a large collection over the left frontal bone.  
**D:** Bone biopsy specimen taken after 6 months of corticosteroid therapy, showing infiltration of the bone marrow spaces by neutrophils and scattered osteoclastic giant cells adjacent to the bony trabeculae, indicating active inflammation (haematoxylin and eosin stain; original magnification,  $\times 400$ ).  
**E:** Bone biopsy specimen taken after 6 months of corticosteroid therapy, showing plasma cells with admixed fibrosis, indicating chronic inflammation (haematoxylin and eosin stain; original magnification,  $\times 400$ ). ◆

Osteomyelitis of the skull is uncommon; recognised clinical syndromes include frontal bone osteomyelitis secondary to frontal sinusitis, and skull base osteomyelitis associated with malignant otitis externa. Skull osteomyelitis may also result from direct inoculation during surgery or occur in association with retrograde septic thrombophlebitis.<sup>2</sup> Haematogenous seeding of bacteria in the skull is rare. Although our patient had no clinically or radiographically recognised sinusitis or history of dental instrumentation or infection, it is likely that the organism originated in the oral cavity or frontal sinus. The duration of the history suggests that chronic osteomyelitis may have accounted for our patient's initial symptoms, but, if present, Paget's disease of the skull may have predisposed to bacterial seeding. Paget's disease is a reported risk factor for osteomyelitis of the jaw.<sup>2</sup>

Pott's puffy tumour is a complication of frontal osteomyelitis that was first described by Sir Percival Pott in 1760.<sup>3</sup> It appears as a circumscribed swelling on the forehead, representing a subperiosteal abscess that forms when infection breaks through the frontal bone.<sup>2</sup> Epidural abscess, subdural empyema, brain abscess and cortical vein thromboses have been described in association with Pott's puffy tumour. It was predominantly seen in children and adolescents before the widespread availability of antibiotics.<sup>2,4</sup> In our patient, the administration of corticosteroids masked the underlying anaerobic infection until dose tapering permitted an abscess to form.

Our patient illustrates a diagnostic challenge. It seemed unlikely that two unrelated diagnoses would account for a single presentation, but the prompt clinical response to corticosteroids led to a

delay in diagnostic bone biopsy. The final diagnosis of frontal bone osteomyelitis with subperiosteal abscess is a reminder of a condition seen commonly in the pre-antibiotic era.

### Competing interests

None identified.

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### References

- 1 Finegold SM. Anaerobic infections in humans: an overview. *Anaerobe* 1995; 1: 3-9.
- 2 Bieluch VM, Garner JG. Osteomyelitis of the skull, mandible, and sternum. In: Jauregui LE, editor. *Diagnosis and management of bone infections*. New York: M Dekker, Informa Healthcare, 1995: 109-110.
- 3 Ravitch MM. Surgery in 1776. *Ann Surg* 1977; 186: 291-300.
- 4 Bambakidis NC, Cohen AR. Intracranial complications of frontal sinusitis in children: Pott's puffy tumour revisited. *Pediatr Neurosurg* 2001; 35: 82-89.

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